WE CLAIM:

1. A communication signal receiver comprising:

a) a foreground processing section having a foreground automatic frequency control (AFC) loop configured to control a frequency of a first reference signal used to process a received signal; and

b) a background processing section configured to control a frequency of a second reference signal used to process an output signal of the foreground processing section, wherein the frequency of the second reference signal is controlled so that effects of the foreground AFC loop are removed from the output signal of the foreground processing section.

2. The receiver of claim 1, wherein the foreground AFC loop comprises:

a) a low pass filter;

b) a foreground AFC unit connected to the low pass filter;

c) a local oscillator connected to the foreground AFC unit and configured to generate the first reference signal; and

d) a mixer connected at a first input to the local oscillator, at a second input to the received signal and at an output to the low pass filter.

3. The receiver of claim 2, wherein:

the foreground AFC loop further comprises an analog to digital converter (ADC) connected to the low pass filter; and

the foreground AFC unit and the background processing section are implemented in a digital signal processor (DSP).

4. The receiver of claim 1, wherein the background processing section comprises:

a) a background AFC unit;

b) a background oscillator connected to the background AFC unit and configured to generate the second reference signal;

c) a background mixer connected at a first input to the background oscillator and at a second input to the output signal of the foreground processing section; and

d) a detector connected to an output of the background mixer.

5. The receiver of claim 4, wherein the background processing section further comprises a frame synchronization detector connected to the output signal of the foreground processing section buffer and the background oscillator.

6. The receiver of claim 5, wherein the background processing section further comprises a decision directed automatic frequency control (DDAFC) unit connected to the output of the background mixer and to the background oscillator.

7. The receiver of claim 6, wherein:

the background AFC unit, the frame synchronization detector and the DDAFC unit are configured to calculate respective offset estimates and to generate respective frequency control signals;

the background processing section further comprises a signal adder having a plurality of inputs respectively connected to the frequency control signals from the background AFC unit, the frame synchronization detector and the DDAFC unit and an output connected to the background oscillator; and

the frequency of the second reference signal is controlled based on the sum of the frequency control signals.

8. The receiver of claim 1, further comprising a buffer connecting the foreground processing section to the background processing section.

9. The receiver of claim 4, wherein the detector is a soft decision signal detector.

10. The receiver of claim 1, implemented in a communication device selected from the group consisting of: mobile communication devices, hand-held communication devices, personal digital assistants (PDAs) with communication functions, wireless modems, cellular phones, one-way pagers and two-way pagers.

11. A method for processing a communication signal, the method comprising:

a foreground process comprising the steps of:

a) determining if an input communication signal is available, and if a signal is not available terminating the process;

b) processing the input signal using a first reference signal;

c) passing the output from step b) through a foreground automatic frequency control (AFC) unit to generate a first frequency control signal; and

d) controlling a frequency of the first reference signal based on the first frequency control signal; and

a background process comprising the steps of:

a) receiving a foreground processed signal from the foreground process;

b) processing the foreground processed signal using a second reference signal;

c) passing the foreground processed signal through a background AFC unit to generate a second frequency control signal; and

d) controlling a frequency of the second reference signal based on the second frequency control signal so that the step of processing the foreground processed signal removes effects of the foreground process step of controlling the frequency of the first reference signal from the foreground processed signal.

12. The method of claim 11, wherein:

the signal from step b) of the foreground process is stored in a buffer; and

step a) of the background process comprises the step of reading the signal from the buffer.

13. The method of claim 11, wherein step b) of the foreground process comprises the steps of:

b1) mixing the input signal with the first reference signal; and

b2) passing the resultant signal from step b1) through a low pass filter.

14. The method of claim 13, wherein step b) of the foreground process further comprises the step of passing the resultant signal from step b2) through an analog to digital converter, and wherein the step c) of the foreground process and steps a) through d) of the background process are performed in a digital signal processor (DSP).

15. The method of claim 11, wherein step d) of the foreground process comprises the steps of:

d1) controlling a frequency of an output signal of an oscillator using the first frequency control signal; and

d2) mixing the output signal of the oscillator with a signal from a local oscillator to generate the first reference signal.

16. The method of claim 11, further comprising the steps of:

c1) testing the foreground processed signal to determine if a frame synchronization signal has occurred; and

c2) if a frame synchronization signal has occurred, calculating a third frequency control signal,

wherein the step d) of the background process comprises controlling the frequency of the second reference signal based on both the second and the third frequency control signals.

17. The method of claim 16, further comprising the step of:

c3) if a frame synchronization signal has occurred, passing the output of step b) of the background process through a decision directed automatic frequency control (DDAFC) to create a fourth frequency control signal,

wherein the step d) of the background process comprises controlling the frequency of the second reference signal based on the second, third and fourth frequency control signals.

18. The method of claim 12, wherein the foreground process is repeated as long as an input communication signal is available.

19. The method of claim 18 wherein the output of step b) of the background process is provided to a detector.

20. The method of claim 19, wherein the background process is performed as long as the input communication signal includes data to be detected by the detector.

21. The method of claim 11, wherein step b) of the background process comprises the step mixing the foreground processed signal with the second reference signal.

22. The method of claim 21, wherein step b) of the background process further comprises the step of low pass filtering the resultant signal from the step of mixing.

23. The method of claim 11, implemented in a communication device selected from the group consisting of: mobile communication devices, hand-held communication devices, personal digital assistants (PDAs) with communication functions, wireless modems, cellular phones, one-way pagers and two-way pagers.

24. A communication signal receiver comprising:

a) means for foreground processing including means for implementing a foreground automatic frequency control (AFC) loop configured to control a frequency of a first reference signal used to process a received signal; and

b) means for background processing, for controlling a frequency of a second reference signal used to process an output signal of the means for foreground processing, wherein the means for background processing controls the frequency of the second reference signal so that effects of the means for implementing a foreground AFC loop are removed from the output signal of the means for foreground processing.

25. A computer readable medium containing instructions for implementing a method for processing a communication signal, the method comprising:

a foreground process comprising the steps of:

a) determining if an input communication signal is available, and if a signal is not available terminating the process;

b) processing the input signal using a first reference signal;

c) passing the output from step b) through a foreground automatic frequency control (AFC) unit to generate a first frequency control signal; and

d) controlling a frequency of the first reference signal based on the first frequency control signal; and

a background process comprising the steps of:

a) receiving a foreground processed signal from the foreground process;

b) processing the foreground processed signal using a second reference signal;

c) passing the foreground processed signal through a background AFC unit to generate a second frequency control signal; and

d) controlling a frequency of the second reference signal based on the second frequency control signal so that the step of processing the foreground processed signal removes effects of the foreground process step of controlling the frequency of the first reference signal from the foreground processed signal.

26. The medium of claim 25, implemented as a digital signal processor (DSP).

27. The medium of claim 26, wherein:

the DSP further includes a soft decision signal detector; and

the background process further comprises the step of forwarding the signal from step b) of the background process to the signal detector.

28. The medium of claim 25, wherein:

the signal from step b) of the foreground process is stored in a buffer; and

step a) of the background process comprises the step of reading the signal from the buffer.

29. The medium of claim 25, implemented in a communication device selected from the group consisting of: mobile communication devices, hand-held communication devices, personal digital assistants (PDAs) with communication functions, wireless modems, cellular phones, one-way pagers and two-way pagers.

30. A wireless communication device comprising:

a transceiver configured to transmit and receive communication signals; and

a digital signal processor (DSP) operatively coupled to the transceiver, the DSP comprising computer software code for processing a communication signal, by performing the functions of:

a foreground process comprising the steps of:

a) determining if an input communication signal is available, and if a signal is not available terminating the process;

b) processing the input signal using a first reference signal;

c) passing the output from step b) through a foreground automatic frequency control (AFC) unit to generate a first frequency control signal; and

d) controlling a frequency of the first reference signal based on the first frequency control signal; and

a background process comprising the steps of:

a) receiving a foreground processed signal from the foreground process;

b) processing the foreground processed signal using a second reference signal;

c) passing the foreground processed signal through a background AFC unit to generate a second frequency control signal; and

d) controlling a frequency of the second reference signal based on the second frequency control signal so that the step of processing the foreground processed signal removes effects of the foreground process step of controlling the frequency of the first reference signal from the foreground processed signal.

31. The wireless communication device of claim 30, wherein the device is selected from the group consisting of: mobile communication devices, hand-held communication devices, personal digital assistants (PDAs) with communication functions, wireless modems, cellular phones, and two-way pagers.